
Protium aidanianum, a New Species from Western Amazonia. Studies in Neotropical Burseraceae XII

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ABSTRACT. *Protium aidanianum* (Burseraceae), a distinctive new species from western Amazonian Ecuador and Peru, is described, illustrated, and discussed. It resembles *P. nodulosum* Swart because of its large, coriaceous leaflets and large, brownish, substipitate, lenticellate fruits, but the new species has leaves 5- or 6-jugate (vs. 2- to 4-jugate), lateral leaflet base truncate to slightly cordate (vs. usually acute), inflorescence shorter than the petiole of the subtending leaf, flowers 4-merous (not 5-merous), petals glabrous and not persistent in fruit (vs. pubescent and often persistent and reflexed in young fruits), pistillode glabrous, and fruit larger and with rounded (vs. acuminate) apex. It resembles *P. glabrescens* Swart due to its robust branchlets, the inflorescence shorter than the petiole of the subtending leaf, and the petiole often turning black and exfoliating, but the new species differs by its deeply canaliculate petiole, higher-order venation impressed adaxially, shorter pedicel, petal margin long-papillate, and fruit brown or coffee-colored and much larger. The fact that only 1 of the 16 collections known to date has flowers highlights both the difficulty of finding flowering material and the need to actively seek it, particularly for dioecious tropical trees with small green flowers.

Key words: Amazonia, Burseraceae, Ecuador, Neotropics, Peru, *Protium*.

Documentation of the Neotropical flora has improved significantly over the past 30 years, but the increase in collections of new taxa and progress toward more realistic distribution records has not been matched by an increase in the proportion of systematically useful collections. Particularly in light of the recent surge in developmental studies for phylogenetic work (e.g., Costello & Motley, 2001), adequate representation of a species ultimately requires collections for every developmental stage of inflorescences, flowers, and fruits, as well as seeds, germinating seeds, and seedlings.

As in many tropical tree groups, the flowers of Burseraceae are small, green (usually), and unisex-

ual (most), the latter implying the need for flowering material from both staminate and pistillate individuals. Moreover, for many taxa the flowers persist only a short time. The net result is that tropical systematists have cabinets full of new taxa represented by material insufficient for full description and therefore publication. Two strategies can compensate for this: first, botanists collecting tropical trees should always use binoculars to assist in location of flowering trees; and second, phenological studies often help to catch trees that have short flowering phases. Meanwhile, the following new species from Amazonian Ecuador and Peru is represented by 16 collections, but 3 are sterile, 12 have fruits (most with immature fruits), and 1 has buds and a few staminate flowers only.

Protium aidanianum Daly, sp. nov. TYPE: Ecuador. Napo: La Joya de los Sachas, Pompeya, S side of Río Napo, Río Jivino, Maxus Camp, km 5–7 Maxus Road, 00°25'S, 76°37'W, 220 m, 22–24 Aug. 1992 (fl), A. Grijalva & E. Gudiño 2 (holotype, NY [2]; isotypes, MO, QCNE). Figure 1.

Arbor medioeris vel grandis foliola grandia coriacea fructus grandis bruneolus lenticellatus a *P. noduloso* foliolis 5–6-jugatis (non 2–4-jugatis) inflorescentia petiolo brevior floribus 4-partitis (nec 5-partitis) petalis glabris fructu grandiore apice rotundo differt. A *P. glabrescenti* nervis tertiariis adaxialibus impressis pedicellis brevioribus petalis longo-papillatis fructu grandiore bruneolo (nec rubello) differt.

Tree, reproductive height (6)10–30 m × 12–50 cm; buttresses present at least sometimes (“high” in Pinkley 478 in sched., at base in SEF 10367); bark gray-green, smooth, outer bark 2 mm thick on small trees (SEF 10367), inner bark yellow-brown; branchlets robust, to 1.5 cm diam. proximal to apex; trichomes of four types: malpighiaceae hairs with lateral length ca. 0.2 mm; fine erect “bristles” to 0.05 mm long (to 0.1 mm on adaxial midvein); capitate glands; and thick golden appressed hairs to 0.1 mm long, these mostly at inflorescence branching points. Leaves 5- to 6-jugate, 43–90 cm long; petiole 7–31 cm × 6–9 mm, toward the base deeply

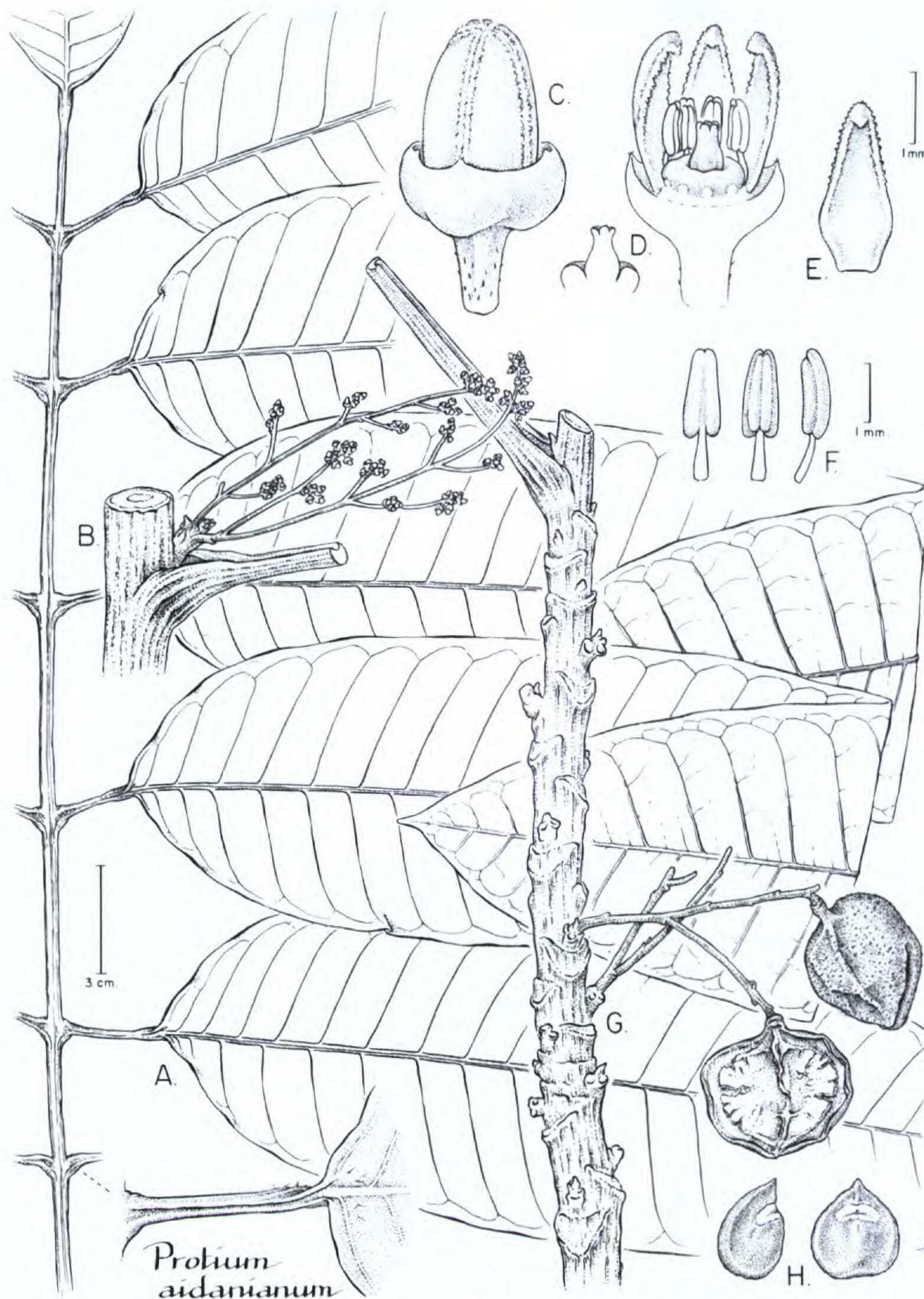


Figure 1. *Protium aidanianum* Daly. —A. Portion of leaf, with inset showing detail of petiolule. —B. Young inflorescence arising from leaf axil. —C. Staminate bud. —D. Staminate flower with part of calyx, one petal, and four stamens removed (right), and longisecion of disk and pistillode (left). —E. Adaxial view of petal. —F. Dorsal, ventral, and lateral view of stamen. —G. Fruiting branchlet with leaf removed. —H. Lateral and ventral views of pyrene. (Based on A. Cerón 3464, Grijalva & Gudiño 2, Tunqui 251.)

canaliculate and broad (nearly semi-clasping), often lenticellate; interjuga 2–7 cm long, petiole and rachis provided with sparse to scattered malpighiaceus hairs, usually with sparse to scattered bristles, and sometimes with sparse glands, in fruit the petiole and rachis sometimes partly glabrescent, when dry the epidermis black and exfoliating in many spots; lateral petiolules robust, 0.8–3.2 cm long, with a conspicuous pulvinulus at distal end, terminal petiolule 3.5–6.3 cm long; leaflets coriaceous, drying yellowish brown, the laterals 13.5–38.3 × 5.5–12 cm, the basal pair (broadly) elliptic to oblong-elliptic, other laterals oblong to oblong-

elliptic; terminal leaflet 17.5–31 × 8–11 cm, oblong-elliptic to slightly oblanceolate, leaflet apex abruptly and narrowly acuminate, the acumen (0.2)0.6–1.5 cm long, leaflet base subequal, on laterals truncate to slightly cordate, on the terminal one obtuse to slightly cordate, the midvein acutely prominent abaxially, the remaining vein orders prominulous, the midvein and secondary veins provided abaxially with scattered to sparse bristles (sometimes to 0.1 mm long) and sometimes scattered thick appressed hairs; the midvein prominulous but sunk in a groove adaxially, remaining vein orders impressed (sometimes the tertiary and higher

orders flat), the midvein provided with scattered bristles to 0.1 mm long as well as capitate glands. *Inflorescences* (Fig. 1B) (3.3)5–15.5 cm \times 0.3–0.4 mm (\times 3.5–4 mm in fruit), shorter than petiole of subtending leaf, secondary axes to 4.5 cm long, axes provided with sparse to scattered malpighiaceus hairs and sparse bristles, sometimes also with sparse glands; bracts on primary inflorescence axes (1)1.3–2 mm long, subulate to ovate, bracteoles subtending flowers 0.3–0.5 mm long, subulate, the bracts densely provided with thick appressed hairs; flowering pedicel 0.7–1.5 \times 0.3–0.4 mm, provided with scattered malpighiaceus hairs and (at the base) sparse bristles and capitate glands. *Staminate flowers* (Fig. 1C–F) 4-merous, ca. 3.3 mm long overall at anthesis; calyx ca. 1–1.2(1.4) \times 2.1–2.4 mm overall, deeply cupular and slightly urceolate, exceeding the disk, the lobes (0)0.2–0.3 mm long, rounded perdeepressed-deltate or sometimes reduced to an apiculum, calyx glabrous except the lobe apices long-papillate; petals greenish yellow, ca. 2.7 \times 1.2 mm, lanceolate, slightly fleshy, with an inflexed but inconspicuous apiculum 0.3–0.35 mm long, petals glabrous but margin long-papillate; antesealous stamens 1.45–1.5 mm long, filaments strap-shaped, the anthers ca. 1 mm long and oblong, antepetalous stamens 1.25–1.3 mm, the anthers ca. 0.85–0.9 mm long and slightly ovate; disk 0.2–0.35 \times 0.2 mm thick; pistillode 0.65–0.75 \times 0.35–0.7 mm overall, ovary ovoid, the style 0.2 mm high with 4-lobulate apex; *pistillate flowers* unknown. Fruiting pedicel apparently variable in length, 1.5–5.5 \times 2.5–4 mm, terete, *fruit* (Fig. 1G) brown or coffee-colored (reported as blackish green in *Cerón 3464*), 3.2–4.5 \times 2.6–3.5 cm (to 3.8+ cm broad when more than one pyrene develops), broadly ovoid, only slightly oblique, the apex rounded, the base substipitate, obtuse to truncate above the stipe, the surface lenticellate and sometimes provided with scattered bristles and glands; pseudaril white, pulpy, covering all of pyrene, the pyrene (Fig. 1H) 2.4–3.1 \times 1.7–2.3 cm, bony, in dorsiventral view the pyrene broadly ovate with acute to sharply acuminate apex, in lateral view the posterior side semi-ovate, the anterior side semi-obovate but deeply cleft at site of the funicular scar, which is located 66%–80% the distance to the pyrene apex, the funicular scar small, narrowly inverted-crescent shaped; pyrene surface glabrous; *seed* with testa irregularly thickened and cotyledons lobed and contortuplicate; *germination* and *seedlings* unknown.

Distribution and ecology. *Protium aidanianum* shows a western Amazonian distribution, in Ecuador and Peru.

Unlike most *Protium*, the new species tends to occur in waterlogged soils, such as in periodically inundated areas (*SEF 10367*) and river island forests (*Berlin 3538a*), on soils reported as lateritic (*Gentry & Díaz 28254*) or red clay dystropept soils (*Zak 3831*) and at elevations between 180 and 400 m. It is known to flower in August and to fruit between August and January.

Common names and uses. Shakáp (Huambisa, *Berlin 3538a*; *Huashikat 185, 973, 1038*); tofakekopa (Kofán, *Pinkley 478*); chipa (Huambisa, *Tunqui 251*); patu muyu (Quichua, *Grijalva & Gudiño 2*); shirquillo (Quichua, *Revelo 94*). The Huambisa use the fruits to make necklaces (*Huashikat 1038*) and the resin to paint large earthen jars (*Tunqui 251*), while among the Kofán the resin has been applied to the ankles and touched with charcoal to make a black ring (Kofán, *Pinkley 478*), and the lowland Quichua use the resin to make candles (*Revelo 94*).

Etymology. It gives me great pleasure to name this species for my son Aidan, who helped me with the measurements, and who commented that it is quite remarkable; the same goes for him.

The new species most closely resembles another western Amazonian species, *P. nodulosum* Swart, because they both show long lateral petiolules, large coriaceous leaflets that are sometimes oblong and sometimes glossy adaxially, and large, brownish, substipitate, lenticellate fruits. *Protium aidanianum* differs by its leaves 5- or 6-jugate (vs. 2- to 4-jugate), lateral leaflet base truncate to slightly cordate (vs. usually acute), higher-order venation impressed or rarely flat adaxially, inflorescences shorter than the petioles, bracts on primary inflorescence axes (1)1.3–2 (vs. 0.6–0.9) mm long, flowering pedicel shorter (0.7–1.8 vs. ca. 1.5–6 mm), flowers 4-merous (not 5-merous), calyx more deeply cupular with lobes either obsolete or short and broad (0–0.4 vs. ca. 0.4–0.6 mm long), petals glabrous and not persistent in fruit (vs. pubescent, and often persistent and reflexed in young fruits), pistillode glabrous, fruit larger (3.2–4.5 \times 2.6–3.5 vs. ca. 4 \times 2.4 cm) and with rounded (vs. acuminate) apex, and funicular scar on the pyrene located 66%–80% the distance to the pyrene apex (not subapical).

Protium aidanianum also resembles the southwestern Amazonian species *P. glabrescens* Swart because of their robust branchlets, petiole often turning black and exfoliating, leaflets coriaceous and often oblong, secondary veins impressed adaxially (only sometimes in *P. glabrescens*), adaxial surface sometimes glossy, and inflorescence shorter

than the petiole of the subtending leaf. The new species differs by its deeply (vs. shallowly) canaliculate petiole, higher-order venation impressed adaxially, pedicel shorter (ca. 0.7–1.5 vs. 1.5–2 mm), consistently 4-merous flowers (vs. 4- to 5-merous), deeply cupular calyx, petal margin long-papillate (not short-papillate), and the fruit brown or coffee-colored (vs. green, pink, or red-brown), much larger ($3.2\text{--}4.5 \times 2.6\text{--}3.5$ cm with one pyrene, vs. ca. $1.8\text{--}2.1 \times 1.1\text{--}2$ cm), and less oblique.

Paratypes. ECUADOR. **Napo:** P. N. Yasuní, near Amo Sur Heliport, $00^{\circ}52'S$, $76^{\circ}05'W$, 16–19 Jan. 1988 (fr), *Cerón 3464* (NY); La Joya de los Sachas, Pompeya, S side of Río Napo, Río Jivino, Maxus Camp, km 5–7 Maxus Road, $00^{\circ}25'S$, $76^{\circ}37'W$, 23–29 Nov. 1992 (fr), *Grijalva et al. 284* (NY); Canton Francisco de Orellana, Vía de los Zorros, Pozo Jaguar I, $00^{\circ}44'S$, $77^{\circ}05'W$, 23 Oct. 1988 (fr), *Palacios 3205* (NY); Dureno, on Río Aguarico, 4 Oct. 1966 (st), *Pinkley 478* (NY); Tena, Est. Biol. Jatun Sacha, $01^{\circ}04'S$, $77^{\circ}36'W$, 24 Nov. 1994 (fr), *Revelo 94* (NY); P. N. Yasuní, Río Añangu near confluence w/Río Napo, $0^{\circ}312'S$, $76^{\circ}24'W$, 30 June–9 July 1982 (st), *SEF 10367* (NY). **Pastaza:** Carretera de Petro-Canadá, Vía Auca, 115 km S of Coca, 4 km S of Río Tugüino, $01^{\circ}15'S$, $76^{\circ}55'W$, 22–28 Feb. 1989 (st), *Zak 3831* (NY).

Sucumbios: Lago Agrio Canton, Res. Cuyabeno, Tара-
poa-Tipischca, Cruce del Río Cuyabeno, $00^{\circ}01'S$,
 $76^{\circ}15'W$, 14 Nov. 1991 (fr), *Palacios et al. 8957* (NY).
PERU. **Amazonas:** 1 km S of La Poza, Santiago River, 9
Aug. 1979 (fr), *Berlin 3538a* (MO, NY); 1 km from Poza,
E margin of Río Santiago, 24 Aug. 1979 (fr), *Huashikat*
185 (MO, NY); Prov. Condorcanqui, 1 km beh. Caterpiza,
E of Quebrada Caterpiza, Río Santiago, 17 Oct. 1979 (fr),
Huashikat 973 (MO), 24 Oct. 1979 (fr), *Huashikat 1038*
(MO); Río Santiago, Quebrada Caterpiza, 2–3 km beh. Cater-
piza, 7 Dec. 1979 (fr), *Tunqui 251* (MO, NY). **Huán-**
uco: Pachitea, Codo de Pozuzo, trail W of settlement to
lower mountain slopes, $9^{\circ}40'S$, $75^{\circ}28'W$, 17 Oct. 1982
(fr), *Foster 9239* (NY). **Loreto:** Prov. Alto Amazonas, An-
doas, Río Pastaza, near Ecuador border, 17 Nov. 1979 (fr),
Gentry & Díaz 28254 (NY).

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Literature Cited

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